CLAIMS

What is claimed is:

1. A method for depositing a dielectric film, the method comprising:

heating a chamber, within which a substrate is located, to a temperature sufficient to thermally decompose an oxidizing component; and

passing a gas flow over the substrate to deposit the dielectric film, wherein the gas flow includes a silicon bearing component, the oxidizing component, and a chloride component, and wherein the silicon bearing component and the chloride component are distinct from each other.

2. The method of claim 1, wherein the dielectric film is an oxide film.

3. The method of claim 1, wherein the gas flow further includes ammonia, and the dielectric film is an oxynitride film.

4. The method of claim 1, wherein the silicon bearing component consists essentially of one or more halated silanes.

5. The method of claim 1, wherein the silicon bearing component includes at least one component selected from the group consisting of silane, disilane, monochlorosilane, dichlorosilane, trichlorosilane, and tetrachlorosilane, in any combination.

6. The method of claim 1, wherein the chloride component includes at least one component selected from the group consisting of hydrogen chloride and chlorine, in any combination.

7. The method of claim 1, wherein the substrate is heated to a temperature in a range between 700 degrees C. and 950 degrees C., inclusive.

8. The method of claim 1, wherein the gas flow has a total pressure in a range between 50 milliTorr and 4000 milliTorr inclusive.

9. A method for depositing a dielectric film, the method comprising:

heating a substrate to a temperature sufficient to thermally decompose an oxidizing component; and

passing a gas flow over the substrate, wherein the gas flow includes a silicon bearing component, the oxidizing component, and chlorine.

10. The method of claim 9, wherein the silicon bearing component consists essentially of dichlorosilane.

11. The method of claim 9, wherein the oxidizing component consists essentially of nitrous oxide.

12. The method of claim 9, wherein the gas flow further includes ammonia, and the dielectric film is an oxynitride film.

13. A method for depositing a dielectric film, the method comprising:

heating a substrate to a temperature sufficient to thermally decompose an oxidizing component; and

passing a gas flow over the substrate, wherein the gas flow includes a silicon bearing component, the oxidizing component, and hydrogen chloride.

14. The method of claim 13, wherein the silicon bearing component consists essentially of dichlorosilane.

15. The method of claim 13, wherein the oxidizing component consists essentially of nitrous oxide.

16. The method of claim 13, wherein the gas flow further includes ammonia, and the dielectric film is an oxynitride film.

17. A method for depositing a dielectric film, the method comprising:

heating a substrate to a temperature sufficient to thermally decompose an oxidizing component; and

passing a gas flow over the substrate, wherein the gas flow includes a silicon bearing component, an oxidizing component, an ammonia component, and a chloride component that is distinct from the silicon bearing component.

18. The method of claim 17, wherein the silicon bearing component consists essentially of dichlorosilane.

19. The method of claim 17, wherein the oxidizing component consists essentially of nitrous oxide.

20. The method of claim 17, wherein the chloride component consists essentially of hydrogen chloride.

21. The method of claim 17, wherein the chloride component consists essentially of chlorine.

22. A method for depositing an oxynitride film, the method comprising:

heating a substrate to a temperature sufficient to thermally decompose an oxidizing component; and

passing a gas flow over the substrate, wherein the gas flow includes a precursor component, an oxidizing component, an ammonia component, and a chloride component that is distinct from the precursor component.

23. The method of claim 22, wherein the precursor component includes at least one component selected from the group consisting of a silicon bearing component, a tantalum bearing component, and an aluminum bearing component, in any combination.

24. The method of claim 22, wherein the precursor component includes at least one component selected from the group consisting of silane, disilane, monochlorosilane, dichlorosilane, trichlorosilane, and tetrachlorosilane, in any combination.

25. The method of claim 22, wherein the precursor component consists essentially of a tantalum bearing component.

26. The method of claim 22, wherein the precursor component consists essentially of an aluminum bearing component.

27. The method of claim 22, wherein the oxidizing component consists essentially of nitrous oxide.

28. The method of claim 22, wherein the chloride component consists essentially of hydrogen chloride.

29. The method of claim 22, wherein the chloride component consists essentially of chlorine.

30. A method for fabricating a semiconductor device, comprising:

heating a substrate; and

depositing a dielectric layer over the substrate by passing a gas flow over the substrate, wherein the gas flow includes a silicon bearing component, an oxidizing component, and a chloride component, and wherein the silicon bearing component and the chloride component are distinct from each other.

31. The method of claim 30, wherein the gas flow further includes an ammonia component, and the dielectric layer is an oxynitride layer having thermal properties that make the semiconductor device suitable for use as an optical waveguide.

32. The method of claim 30, further comprising:

etching a trench into the substrate, wherein the dielectric layer is an oxide deposited on an inner surface of the trench.

33. The method of claim 32, further comprising:

allowing a native oxide layer to form prior to depositing the dielectric layer;

depositing a nitride layer over the native oxide layer prior to depositing the dielectric layer; and

wherein depositing the dielectric layer includes also including an ammonia component in the gas flow, so that the dielectric layer is an oxynitride layer.

34. The method of claim 30, wherein the semiconductor device includes one or more gates, and wherein the dielectric layer forms one or more spacers for isolating the one or more gates from one or more contacts.

35. The method of claim 30, wherein the semiconductor device includes one or more gates and one or more metal layers, and wherein the dielectric layer forms a cap over the one or more gates and the one or more metal layers.

36. A method for forming a dielectric structure, the method comprising:

heating a silicon substrate, in a furnace deposition tube, to a temperature in a range of 700 degrees C. to 950 degrees C., inclusive; and

thermally oxidizing the silicon substrate, in the furnace tube, using gaseous reactants, which include a chloride component, dichlorosilane, and nitrous oxide.

37. The method of claim 36, wherein the chloride component includes hydrogen chloride.

38. The method of claim 36, wherein the chloride component includes chlorine.

39. The method of claim 38, wherein thermally oxidizing the silicon substrate further includes using ammonia as one of the gaseous reactants.

40. A semiconductor device comprising:

a substrate; and

a dielectric element, which has a residual chlorine, the dielectric element including at least a portion of a chemical vapor deposited dielectric layer formed from passing a gas flow over the substrate to deposit the dielectric layer, wherein the gas flow includes a silicon bearing component, an oxidizing component, and a chloride component, and wherein the silicon bearing component and the chloride component are distinct from each other.

41. The semiconductor device as claimed in claim 40, wherein the semiconductor device comprises a semiconductor capacitive device, and the semiconductor device further comprises:

a first electrode disposed on and insulated from the substrate, wherein the dielectric layer is disposed on the first electrode; and

a second electrode disposed on the dielectric element.

42. The semiconductor device as claimed in claim 40, wherein the semiconductor device comprises:

an optical waveguide device, wherein the substrate includes a first cladding layer, and wherein the dielectric element includes an oxide layer, and wherein the optical waveguide device further includes a second cladding layer overlying the dielectric element.

43. The semiconductor device as claimed in claim 40, wherein the semiconductor device comprises a memory cell.

44. The semiconductor device as claimed in claim 40, wherein the semiconductor device includes at least one floating gate transistor.

45. The semiconductor device as claimed in claim 40, wherein the semiconductor device includes at least one insulated gate transistor.

46. A memory array that is fabricated on a substrate, the memory array including a plurality of memory cells, each memory cell comprising:

a substrate; and

a dielectric element, which has a residual chlorine, the dielectric element including at least a portion of a chemical vapor deposited dielectric layer formed from passing a gas flow over the substrate to deposit the dielectric layer, wherein the gas flow includes a silicon bearing component, an oxidizing component, and a chloride component, and wherein the silicon bearing component and the chloride component are distinct from each other.

47. A memory device, comprising:

an array of memory cells including:

a substrate, and

a dielectric element, which has a residual chlorine, the dielectric element including at least a portion of a chemical vapor deposited dielectric layer formed from passing a gas flow over the substrate to deposit the dielectric layer, wherein the gas flow includes a silicon bearing component, an oxidizing component, and a chloride component, and wherein the silicon bearing component and the chloride component are distinct from each other;

a row access circuit coupled to the array of memory cells;

a column access circuit coupled to the array of memory cells; and

an address decoder circuit coupled to the row access circuit and the column access circuit.

48. A semiconductor die, comprising:

a substrate; and

an integrated circuit supported by the substrate and having a plurality of integrated circuit devices, wherein an integrated circuit device includes a dielectric element, which has a residual chlorine, the dielectric element including at least a portion of a chemical vapor deposited dielectric layer formed from passing a gas flow over the substrate to deposit the dielectric layer, wherein the gas flow includes a silicon bearing component, an oxidizing component, and a chloride component, and wherein the silicon bearing component and the chloride component are distinct from each other.

49. An electronic system comprising:

a processor; and

an integrated circuit coupled to the processor, wherein the integrated circuit further includes:

a substrate; and

an integrated circuit supported by the substrate and having a plurality of integrated circuit devices, wherein an integrated circuit device includes a dielectric element, which has a residual chlorine, the dielectric element including at least a portion of a chemical vapor deposited dielectric layer formed from passing a gas flow over the substrate to deposit the dielectric layer, wherein the gas flow includes a silicon bearing component, an oxidizing component, and a chloride component, and wherein the silicon bearing component and the chloride component are distinct from each other.